SIMANF⬤R

Model for *Quercus pyrenaica* Castilla y León (Spain)

Model

Qpyrenaica__cyl__v01

Model description

- Specie: *Quercus pyrenaica* Willd.

- Spanish Forest Inventory (SFI) code: 43

- Geographical area: Castilla y León

- Geographical area (administrative): León, Palencia, Burgos, Zamora, Valladolid, Soria, Salamanca, Ávila and Segovia

Model type

- Category: growth

- Model level: distance independent individual tree model

- Reproduction methods: seedling and coppice stands

- Stand structure: even-aged stands

- Species composition: monospecific stands

- Forest origin: natural

Model requirements and recommended use

- Initial inventory requirements: age and dominant height of the plot; expan and dbh of the trees

- Geographical area: Castilla y León, closer places and another places with similar characteristics (assuming differences)

- Stand type: monospecific stands

- Execution recommended time: 10 years executions (survival, growth and ingrowth equations developed by using that criteria)

- Site Index is defined as top height at a base age of 60 years

Figure 1: *Quercus pyrenaica*, by Felipe Castilla, website: http://www.arbolapp.es/especies/ficha/quercus-pyrenaica/

Figure 2: Details of *Quercus pyrenaica*, by Duhamel du Monceau, H.L., Traité des arbres et arbustes, Nouvelle édition [Nouveau Duhamel], vol. 7: t. 56 (1800-1803)
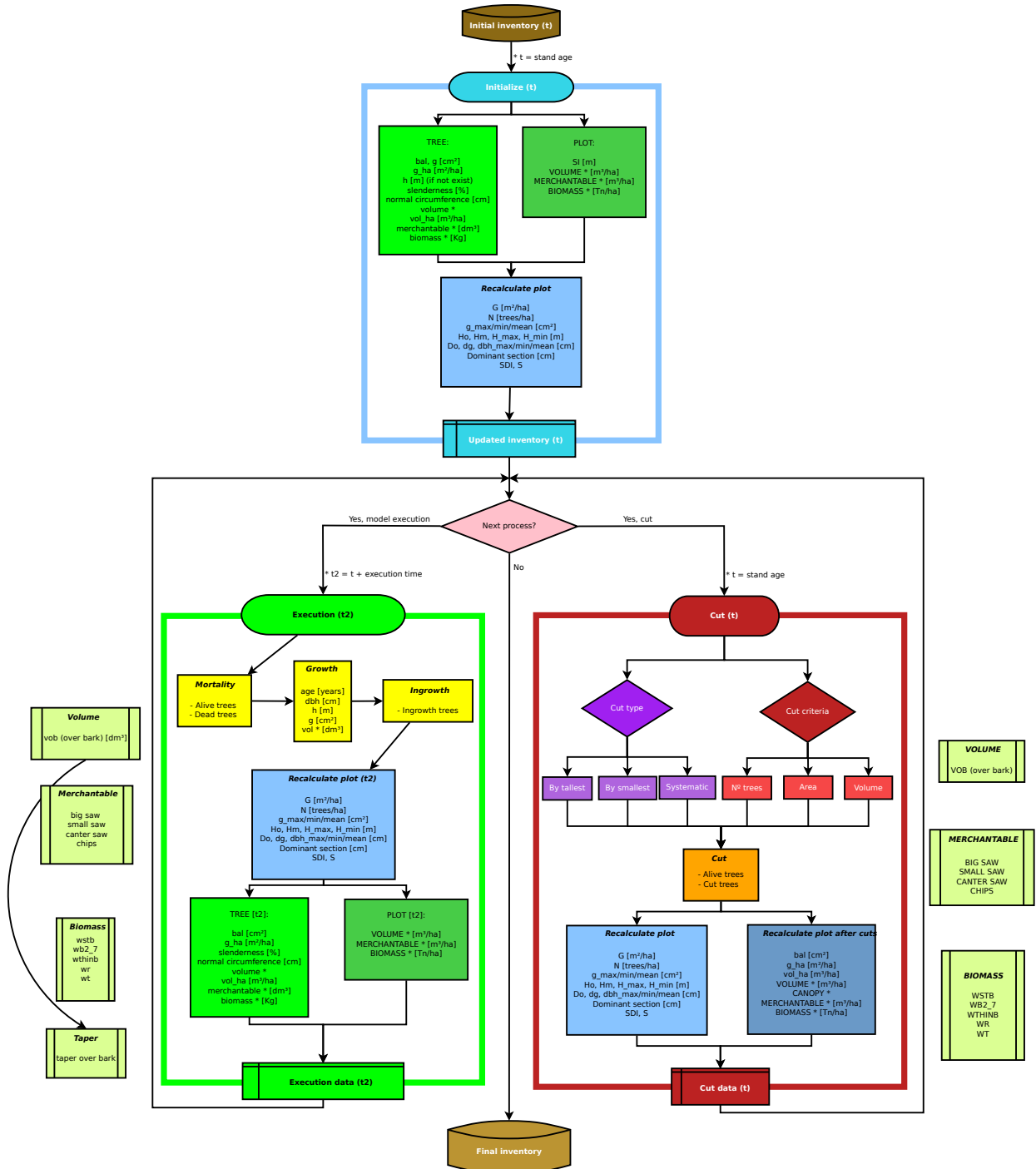

Figure 3: Provenance regions of *Quercus pyrenaica* in Spain, by MAPA

Bibliography

Model components:

- **Site Index equations**:
  Adame P, Cañellas I, Roig S, del Río M (2006). Modelling dominant height growth and site index curves for rebollo oak (Quercus pyrenaica Willd.). Annals of Forest Science, 63(8), 929-940

- **Survival equation**:
  Adame P, del Río M, Cañellas I (2010). Modeling individual-tree mortality in Pyrenean oak (Quercus pyrenaica Willd.) stands. Annals of forest science, 67(8), 810

- **Diameter growth equation**:
  Adame P, Hynynen J, Cañellas I, del Río M. (2008). Individual-tree diameter growth model for rebollo oak (Quercus pyrenaica Willd.) coppices. Forest Ecology and Management, 255(3-4), 1011-1022

- **Ingrowth equation**:
  Adame P, del Río M, Cañellas I (2010). Ingrowth model for pyrenean oak stands in north-western Spain using continuous forest inventory data. European journal of forest research, 129(4), 669-678

- **Ingrowth distribution**:
  By default

- **General calculations: bal, g, slenderness, normal circumference**:
  Standard equations

- **Generalized height-diameter equation**:
  Adame P, del Río M, Cañellas I (2008). A mixed nonlinear height–diameter model for pyrenean oak (Quercus pyrenaica Willd.). Forest ecology and management, 256(1-2), 88-98

- **Taper equations over bark (volume)**:
  Rodríguez F, Lizarralde I (2015). Comparison of stem taper equations for eight major tree species in the Spanish Plateau. Forest systems, 24(3), 2

- **Biomass equations**:
  Ruiz-Peinado R, Montero G, del Rio M (2012). Biomass models to estimate carbon stocks for hardwood tree species. Forest systems, 21(1), 42-52

- **Technological wood uses information**:
  Rodríguez F (2009). Cuantificación de productos forestales en la planificación forestal: Análisis de casos con cubiFOR. In Congresos Forestales

- **Value for Reineke Index equation**:
  Standard

Initial inventory (t)

*t = stand age

Initialize (t)

TREE:
bal, g [cm²]
g_ha [m²/ha]
h [m] (if not exist)
slenderness [%]
normal circumference [cm]
volume *
vol_ha [m³/ha]
merchantable * [dm³]
biomass * [Kg]

PLOT:
SI [m]
VOLUME * [m³/ha]
MERCHANTABLE * [m³/ha]
BIOMASS * [Tn/ha]

Recalculate plot

G [m²/ha]
N [trees/ha]
g_max/min/mean [cm²]
Ho, Hm, H_max, H_min [m]
Do, dg, dbh_max/min/mean [cm]
Dominant section [cm]
SDI, S

Updated inventory (t)

Next process?

Yes, model execution — *t2 = t + execution time

No

Yes, cut — *t = stand age

Execution (t2)

Mortality
- Alive trees
- Dead trees

Growth
age [years]
dbh [cm]
h [m]
g [cm²]
vol * [dm³]

Ingrowth
- Ingrowth trees

Recalculate plot (t2)

G [m²/ha]
N [trees/ha]
g_max/min/mean [cm²]
Ho, Hm, H_max, H_min [m]
Do, dg, dbh_max/min/mean [cm]
Dominant section [cm]
SDI, S

TREE [t2]:
bal [cm²]
g_ha [m²/ha]
slenderness [%]
normal circumference [cm]
volume *
vol_ha [m³/ha]
merchantable * [dm³]
biomass * [Kg]

PLOT [t2]:
VOLUME * [m³/ha]
MERCHANTABLE * [m³/ha]
BIOMASS * [Tn/ha]

Execution data (t2)

Cut (t)

Cut type

Cut criteria

By tallest | By smallest | Systematic

Nº trees | Area | Volume

Cut
- Alive trees
- Cut trees

Recalculate plot

G [m²/ha]
N [trees/ha]
g_max/min/mean [cm²]
Ho, Hm, H_max, H_min [m]
Do, dg, dbh_max/min/mean [cm]
Dominant section [cm]
SDI, S

Recalculate plot after cuts

bal [cm²]
g_ha [m²/ha]
vol_ha [m³/ha]
VOLUME * [m³/ha]
CANOPY *
MERCHANTABLE * [m³/ha]
BIOMASS * [Tn/ha]

Cut data (t)

Final inventory

Volume
vob (over bark) [dm³]

Merchantable
big saw
small saw
canter saw
chips

Biomass
wstb
wb2_7
wthinb
wr
wt

Taper
taper over bark

VOLUME
VOB (over bark)

MERCHANTABLE
BIG SAW
SMALL SAW
CANTER SAW
CHIPS

BIOMASS
WSTB
WB2_7
WTHINB
WR
WT

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Interest Links

**SiManFor: Support system for simulating Sustainable Forest Management Alternatives (2020)
In: SiManFor. http://www.simanfor.es/. Accesed 15 May 2020**

**Sustainable Forest Management Research Institute UVa-INIA (iuFOR) (2020) In iuFOR. http://sostenible.palen
Accesed 15 May 2020**

**Higher Technical School of Agricultural Engineering of Palencia. (2020) In: ETSIIAA Palen-
cia. http://etsiiaa.uva.es/. Accesed 15 May 2020**

**University of Valladolid (UVa). (2020) In: UVa. http://www.uva.es/export/sites/uva/. Ac-
cesed 15 May 2020**